



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: LEAP-1A24/24E1/23 BYPASS RATIO (-): 11.1
 UNIQUE ID NUMBER: 01P20CM127 PRESSURE RATIO π_{co} (-): 30.0
 COMBUSTOR: TAPS II
 ENGINE TYPE: TF RATED OUTPUT F_{co} (kN): 106.8

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{co} (mg/kN)	LTO_{num}/F_{co} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{co} AND MAX nvPM _{mass}	3.3	3.57E+13	206
AS % OF CAEP/10 LIMIT	-	-	3.2
AS % OF CAEP/11 LIMIT (InP)	0.1	0.2	
AS % OF CAEP/11 LIMIT (NT)	0.7	0.6	

MEASURED DATA

MODE	POWER SETTING (% F_{co})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	0.745	1.1	7.90E+10	
CLIMB OUT	85	2.2	0.616	0.9	6.85E+10	
APPROACH	30	4.0	0.219	1.2	4.25E+13	
IDLE	7	26.0	0.087	0.6	3.69E+12	
LTO TOTAL (kg, mg, number of particles)			301	257	2.74E+15	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{co} VALUES (mg/kN, particles/kN)				2.4	2.57E+13	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				7.7	2.20E+14	160

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{co})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	1.4	1.07E+11
CLIMB OUT	85	1.0	9.23E+10
APPROACH	30	1.9	2.76E+14
IDLE	7	0.8	1.30E+13

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	97.8	98.8	HEAT OF COMBUSTION (MJ/kg)	43.26
TEMPERATURE (K)	274.6	279.8	HYDROGEN CONTENT (%mass)	13.69
HUMIDITY (kg water/kg dry air)	0.0020	0.0032	AROMATICS CONTENT (%vol)	16.5
			NAPHTHALENE CONTENT(%vol)	0.66
			SULPHUR CONTENT (ppm by mass)	150

MANUFACTURER: CFM International
 TEST ORGANIZATION: CFM International
 TEST LOCATION: PTO, Ohio
 TEST DATES: 21/11/2016-02/12/2016

REMARKS

1. Certification Report CRL-2201_2/Rev. 4
2. Engine S/N 600-104